MAP MF—1730

DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MAPS SHOWING COAL RESOURCES OF THE AMONATE QUADRANGLE, BUCHANAN AND TAZEWELL COUNTIES, VIRGINIA AND McDOWELL COUNTY, WEST VIRGINIA

By John F. Windolph, Jr.

MISCELLANEOUS FIELD STUDIES MAP
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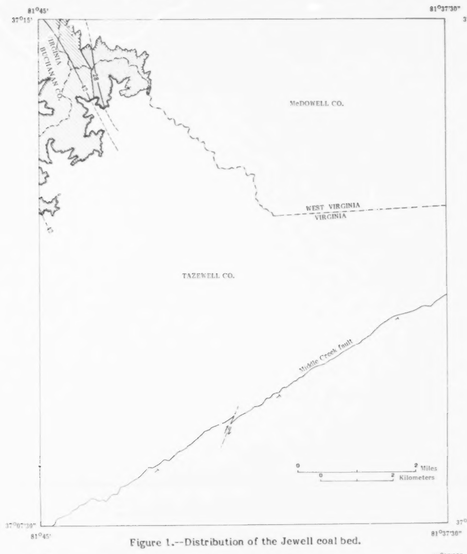

Figure 1.--Distribution of the Jewell coal bed.

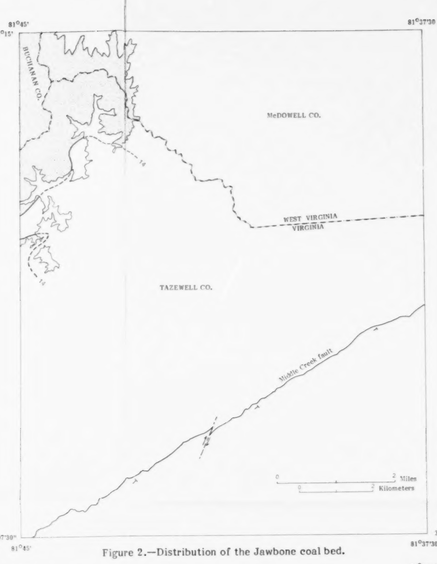

Figure 2.--Distribution of the Jawbone coal bed.

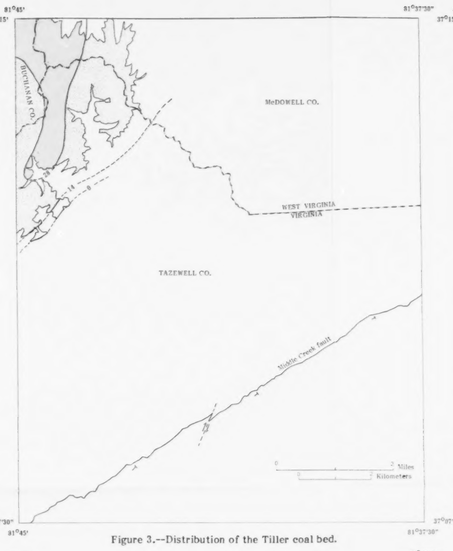

Figure 3.--Distribution of the Tiller coal bed.

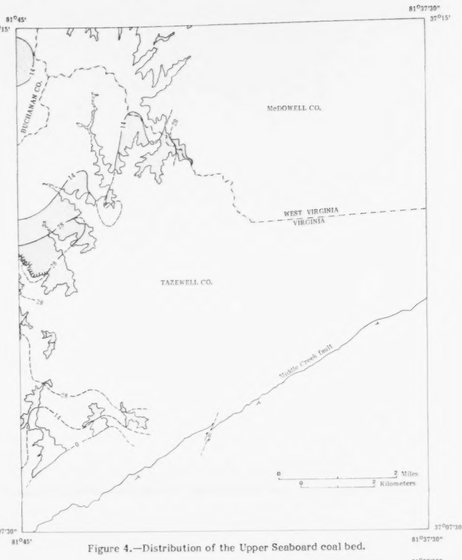

Figure 4.--Distribution of the Upper Seaboard coal bed.

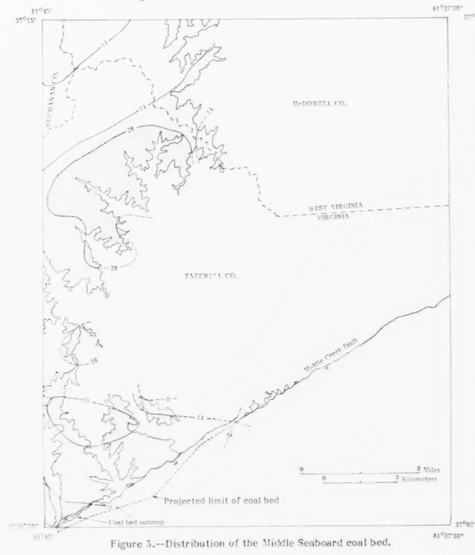

Figure 5.--Distribution of the Middle Seaboard coal bed.

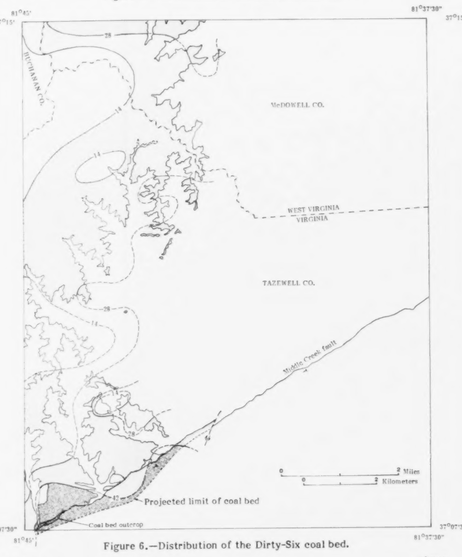

Figure 6.--Distribution of the Dirty-Six coal bed.

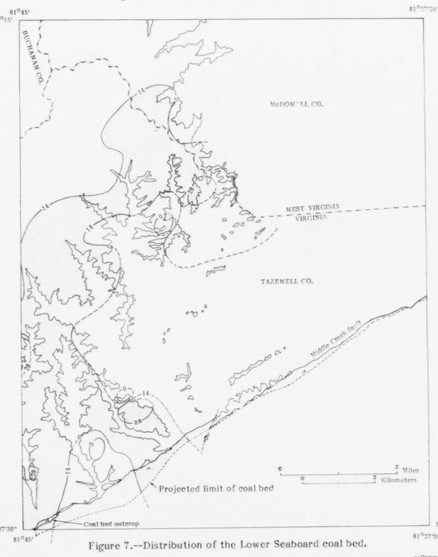

Figure 7.--Distribution of the Lower Seaboard coal bed.

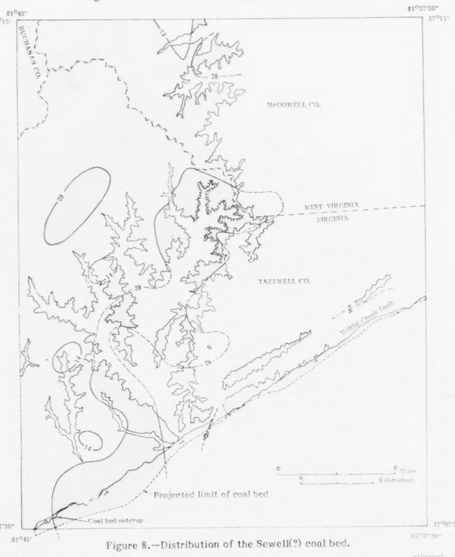

Figure 8.--Distribution of the Sewell(?) coal bed.

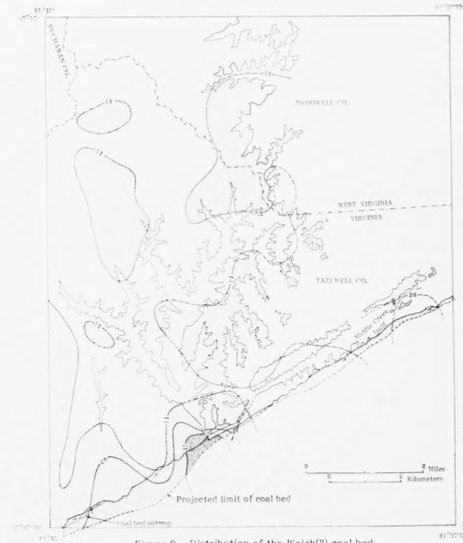

Figure 9.--Distribution of the Welch(?) coal bed.

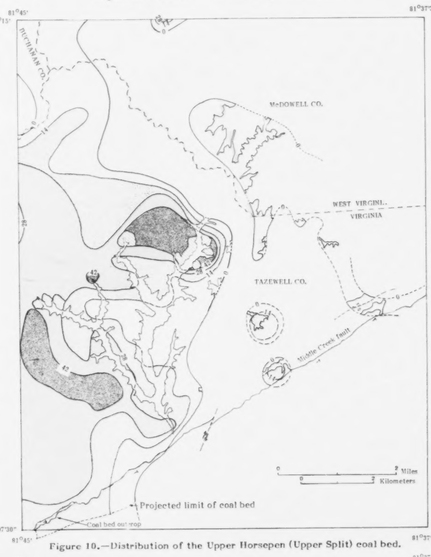

Figure 10.--Distribution of the Upper Horsepen (Upper Split) coal bed.

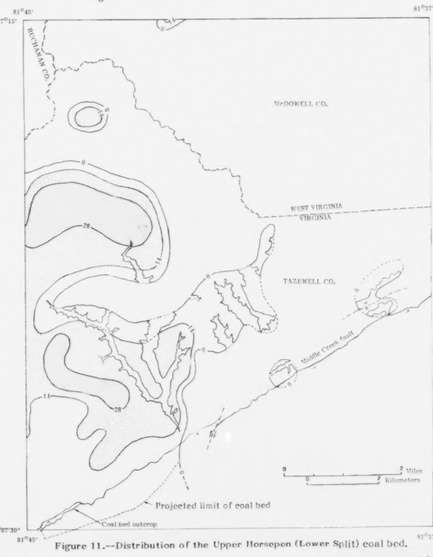

Figure 11.--Distribution of the Upper Horsepen (Lower Split) coal bed.

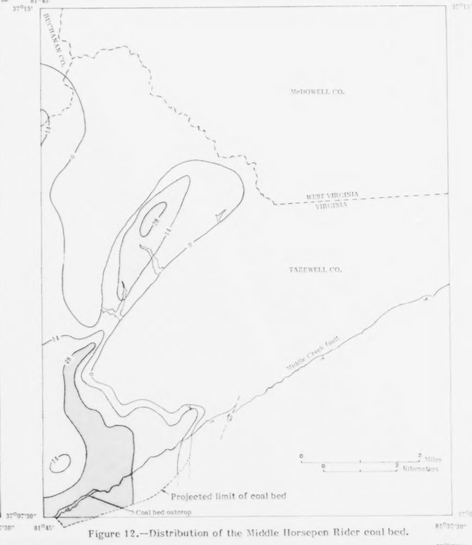

Figure 12.--Distribution of the Middle Horsepen Rider coal bed.

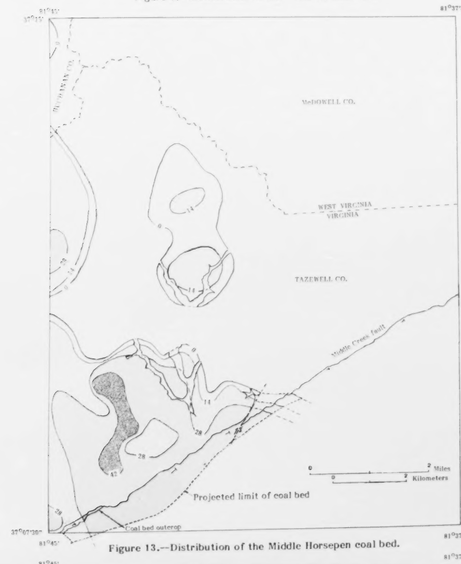

Figure 13.--Distribution of the Middle Horsepen coal bed.

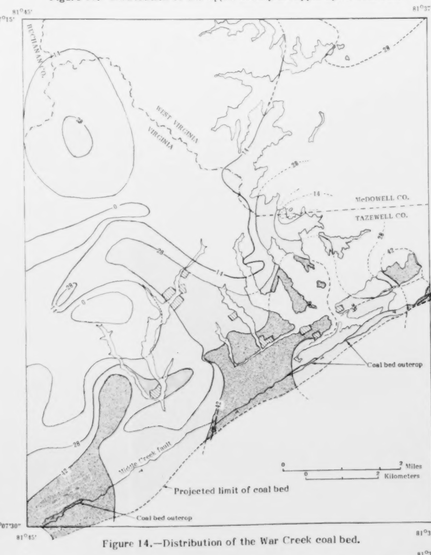

Figure 14.--Distribution of the War Creek coal bed.

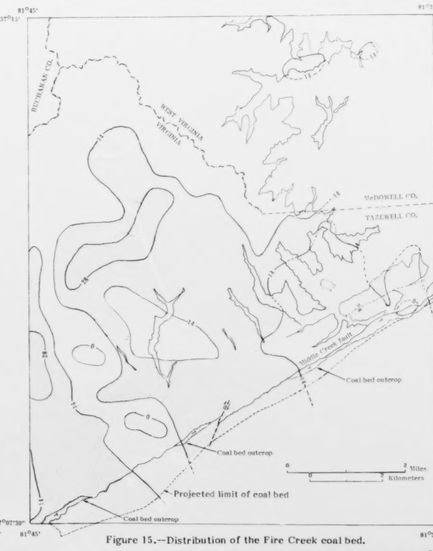

Figure 15.--Distribution of the Fire Creek coal bed.

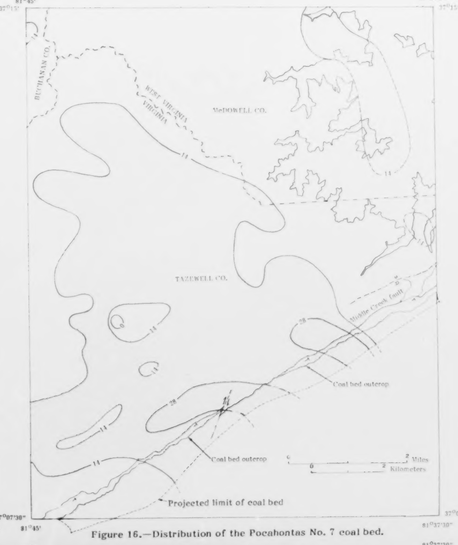

Figure 16.--Distribution of the Pocahontas No. 7 coal bed.

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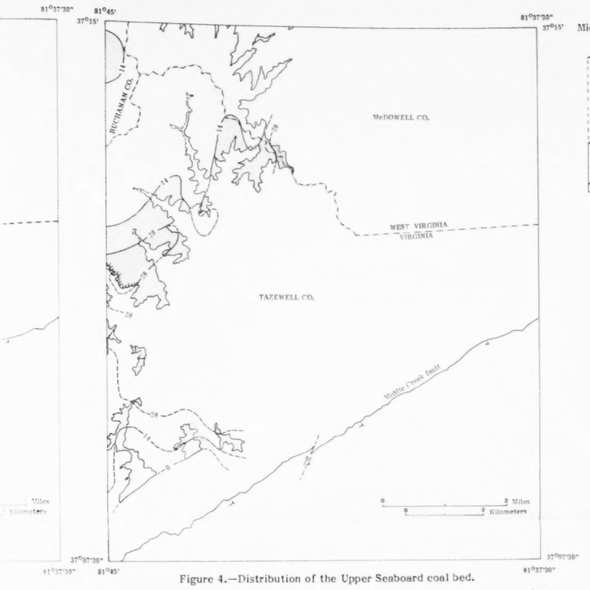


Figure 4.—Distribution of the Upper Seaboard coal bed.

Figure 8.—Distribution of the Sewell(?) coal bed.

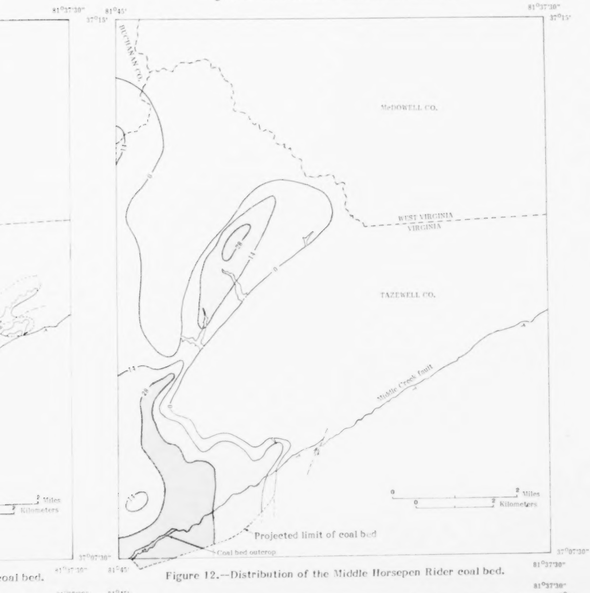


Figure 12.—Distribution of the Middle Horsepen Rider coal bed.

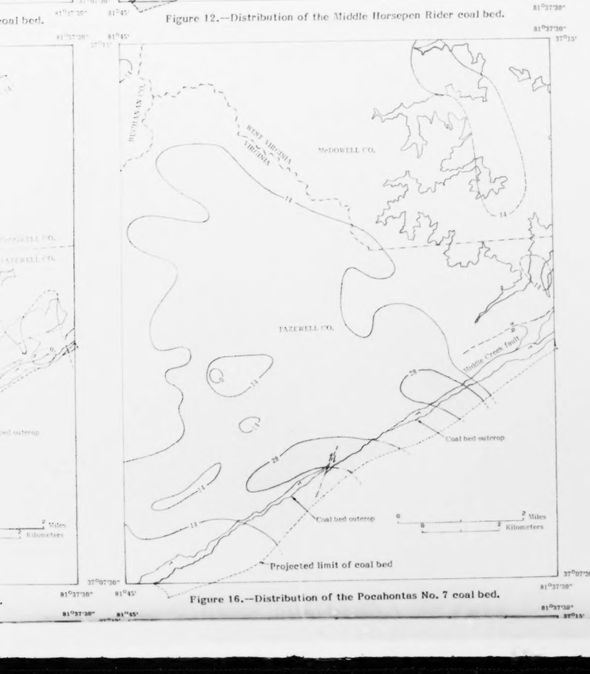


Figure 16.—Distribution of the Pocahontas No. 7 coal bed.

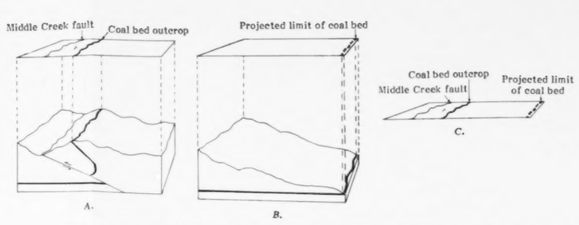


Figure 21.—Depiction of folded and faulted coal bed. *A*, folded and faulted coal bed. *B*, coal bed prior to folding and faulting. *C*, composite of map views of *A* and *B*; corresponds to outlined area on figure 20.

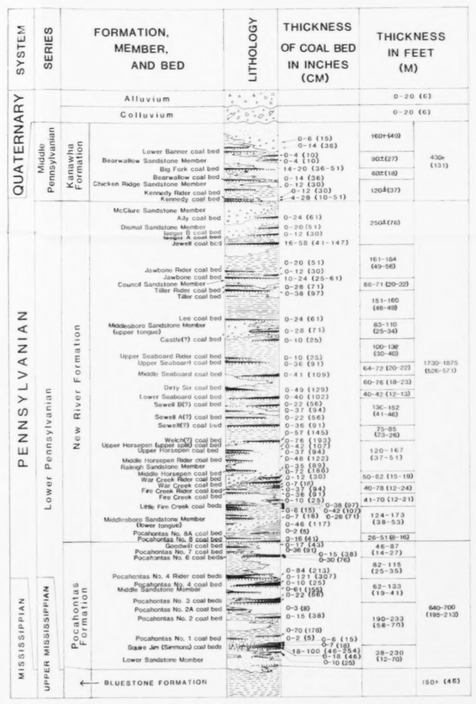


Figure 22.—Generalized stratigraphic column of coal-bearing formations.

EXPLANATION

- Area underlain by estimated coal resources greater than 42 in. (105 cm) thick
- Area underlain by estimated coal resources 28–42 in. (70–105 cm) thick
- Area underlain by estimated coal resources 14–28 in. (35–70 cm) thick
- Area where coal is absent or less than 14 in. (35 cm) thick
- Mined area; dashed where approximate
- Outcrop of coal bed; dashed where approximately located; labeled south of the Middle Creek fault
- Projected limit of coal beds (south of Middle Creek fault) prior to folding and faulting; labeled on map
- —28— Coal thickness line; dashed where approximately located. Thickness is in inches; isopach interval is 14 in.
- Strip mine
- —U— Fault, inferred; U-upthrown, D-downthrown
- Thrust fault; T indicates upper plate
- Tear fault inferred; arrows show relative movement

MINERAL RESOURCES

Coal Geology

Coal is the principle mineral resource developed in the Amonate quadrangle. It is of low- to high-volatile, A-bituminous rank. Total estimated original resources in the quadrangle are 974 million short tons. Coal mined or lost in mining is estimated to be 81 million short tons, leaving approximately 893 million short tons of remaining resources. Table 1 shows the coal resource estimates for all coal beds in the quadrangle by state and county.

The thickest coal over ies lobate sandstone beds of distributary delta systems (Englund, 1974, p. 43). Several coal beds have been extensively developed by underground, surface, and auger methods. Most of the production has been from the Pocahontas No. 3, No. 4, No. 4 Rider, Upper Horsepen, Sewell, and Jewell coal beds. Figures 1-20 show the distribution of coal resources of the major beds in the quadrangle. These should not be interpreted as geologic maps because folded and faulted portions of the coal beds south of the Middle Creek fault on figures 5-20 are depicted as if they were flat lying for purposes of resource calculations (fig. 21).

Approximately 3,150 feet (960 m) of coal-bearing rocks crop out in the quadrangle. These include the entire Pocahontas and New River Formations of Early Pennsylvanian age and the lower portion of the Kanawha Formation of Middle Pennsylvanian age. Figure 22 shows stratigraphic relations and thicknesses of the formations, coal beds, and intervening lithologies. Coal lithotypes are predominately thin- to thick-banded vitrinite, bright to dull attritus (mixed lithologies) containing minor fusinite bands, and sparsely disseminated pyrite and calcite. The Squire Jim and Dirty-Six coal beds contain numerous shale and underclay partings. Pocahontas coal is mostly fine cleated, whereas New River and Kanawha coals are medium to coarsely cleated. The coal field south of the Middle Creek fault has been deformed tectonically and a narrow belt of coal-bearing rocks is overturned, faulted, or asymmetrically folded. Coal beds in this belt have been sheared and crushed.

Thirty coal samples from 15 different beds were analyzed for trace elements (table 2) and major and minor oxide composition (table 3). Proximate and ultimate analyses for eight coal samples from five different beds are listed in table 4. The Middle Seaboard, War Creek Rider, and Squire Jim coal samples are high in trace element concentration and ash composition due to the inclusion of partings. The heating value for the Squire Jim coal, in parenthesis, was calculated as moisture and ash free. Most of the coal in the quadrangle is of high quality and is suitable for coke manufacture. Analyses of the samples, on an as-received basis, show that most of the coal is low to moderately high in ash (less than 9 percent), low to moderate in sulfur (less than 1 percent), and high in heating value (greater than 14,000 Btu/pound). No significant amounts of potentially toxic or economically valuable trace elements were found in the samples. Coal resources were calculated according to U.S. Geological Survey Bulletin 1450-B (1976). Analytical data are available from the National Coal Resource Data System (NCRDS).

Other Mineral Occurrences

Minor barite mineralization with accessory pyrite is disseminated in the upper part of the Shady Dolomite in the southeastern part of the quadrangle (Windolph, 1983).

REFERENCES

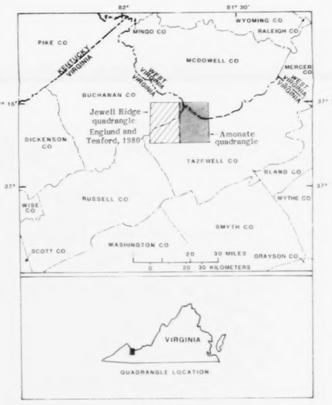
Englund, K. J., 1974, Sandstone distribution patterns in the Pocahontas Formation of southwest Virginia and southern West Virginia, Briggs, Garnett, ed., Carboniferous of the southeastern United States: Geological Society of America Special Paper 148, p. 31–45.

Englund, K. J., and Teaford, N. K., 1980, Maps showing coal resources of the Jewell Ridge quadrangle, Buchanan and Tazewell Counties, Virginia: U.S. Geological Survey Miscellaneous Field Studies Map MF-1211.

Englund, K. J., 1981, Geologic map of the Jewell Ridge quadrangle, Buchanan and Tazewell Counties, Virginia: U.S. Geological Survey Geologic Quadrangle Map GQ-1550, scale 1:24,000.

U.S. Geological Survey, 1976, Coal resource classification system of the U.S. Bureau of Mines and U.S. Geological Survey: U.S. Geological Survey Bulletin 1450-B, 7 p.

Windolph, J.F., Jr., 1983, Geologic map of the Amonate quadrangle, Virginia-West Virginia: U.S. Geological Survey Open-File Report 83-446, scale 1:24,000.



Index Map

Table 1.—*Estimated original and remaining coal resources in the Amonate, Va.-W.Va. quadrangle*
[In thousands of short tons, as of January 1981]

FORMATION	COAL BED	ORIGINAL RESOURCES: MEASURED	INDICATED	INFERRED	TOTAL	REMAINING RESOURCES: MEASURED	INDICATED	INFERRED	TOTAL	MINED OR LOST IN MINING	TOTAL REMAINING RESOURCES
BUCHANAN COUNTY, VA. (crossed by more than 1,000 feet of overburden)											
Kanawha	Lower Banner	22	-	-	22	-	-	-	-	22	22
	Big Fork	201	-	-	201	-	-	-	-	201	201
	Kennedy	-	-	-	-	-	-	-	-	-	-
New River	Jewell	1,154	3,354	4,355	8,863	1,154	3,354	4,355	8,863	1,154	8,863
	Upper Seaboard Rider	135	635	-	770	135	635	-	770	1,924	2,694
	Upper Seaboard	1,778	1,778	-	3,556	1,778	1,778	-	3,556	1,778	5,334
	Dirty Six	139	1,139	971	2,249	139	1,139	971	2,249	1,139	3,388
	Middle Seaboard	41	-	-	41	41	-	-	41	138	179
	Lower Seaboard	138	-	-	138	138	-	-	138	203	341
	Sewell B(?)	147	-	-	147	147	-	-	147	203	350
	Sewell(?)	1,057	2,307	20	3,384	1,057	2,307	20	3,384	3,025	6,409
	TOTALS	4,812	9,213	5,346	19,371	4,812	9,213	5,346	19,371	8,589	27,960
DICKENSON COUNTY, VA. (crossed by more than 1,000 feet of overburden)											
New River	Upper Seaboard	232	-	-	232	232	-	-	232	-	232
	Middle Seaboard	1,196	-	-	1,196	1,196	-	-	1,196	-	1,196
	Dirty Six	1,139	-	-	1,139	1,139	-	-	1,139	-	1,139
	Sewell B(?)	1,275	-	-	1,275	1,275	-	-	1,275	-	1,275
	Middle Horsepen Rider	788	-	-	788	788	-	-	788	-	788
	Middle Horsepen	1,361	-	-	1,361	1,361	-	-	1,361	1,361	2,722
	War Creek	85	-	-	85	85	-	-	85	-	85
Pocahontas	Pocahontas No. 4 Rider	1,788	1,788	1,788	5,364	1,788	1,788	1,788	5,364	-	5,364
	Pocahontas No. 4 coal bed	2,787	2,787	2,787	8,361	2,787	2,787	2,787	8,361	-	8,361
	Pocahontas No. 3	1,787	1,787	1,787	5,361	1,787	1,787	1,787	5,361	-	5,361
	Pocahontas No. 2	1,787	1,787	1,787	5,361	1,787	1,787	1,787	5,361	-	5,361
	TOTALS	14,423	8,149	6,362	28,934	14,423	8,149	6,362	28,934	1,361	30,295
RUSSELL COUNTY, VA. (crossed by more than 1,000 feet of overburden)											
Kanawha	Kelly Mark	18	-	-	18	-	-	-	-	18	18
	Kennedy	36	-	-	36	-	-	-	-	36	36
New River	Jewell	817	526	4,229	5,572	817	526	4,229	5,572	4,774	10,346
	Upper Seaboard	1,053	-	-	1,053	1,053	-	-	1,053	-	1,053
	Upper Seaboard Rider	1,178	-	-	1,178	1,178	-	-	1,178	-	1,178
	Dirty Six	1,410	-	-	1,410	1,410	-	-	1,410	-	1,410
	Middle Seaboard	1,277	1,277	1,277	3,831	1,277	1,277	1,277	3,831	-	3,831
	Lower Seaboard	1,842	1,842	1,842	5,526	1,842	1,842	1,842	5,526	92	5,618
	Sewell B(?)	1,203	1,203	1,203	3,609	1,203	1,203	1,203	3,609	-	3,609
	Sewell A(?)	1,396	1,396	1,396	4,188	1,396	1,396	1,396	4,188	-	4,188
	Sewell(?)	1,242	1,242	1,242	3,726	1,242	1,242	1,242	3,726	1,242	4,968
	Welch(?)	1,847	1,847	1,847	5,541	1,847	1,847	1,847	5,541	1,847	7,388
	Upper Horsepen	1,441	11,441	6,742	21,941	1,441	11,441	6,742	21,941	-	21,941
	Upper Horsepen Rider	-	-	-	-	-	-	-	-	-	-
	Middle Horsepen	6,553	2,982	-	9,535	6,553	2,982	-	9,535	27	9,562
	Lower Horsepen	-	-	-	-	-	-	-	-	-	-
	Middle Horsepen Rider	1,781	1,994	-	3,775	-	-	-	-	-	-
	War Creek	4,782	4,782	4,782	14,346	4,782	4,782	4,782	14,346	10,107	24,453
	War Creek Rider	2,742	4,613	1,744	9,099	2,742	4,613	1,744	9,099	1,744	10,843
	Fair Creek	6,685	11,235	8,360	26,280	6,685	11,235	8,360	26,280	8,360	34,640
	Fire Creek	2,480	2,480	-	4,960	2,480	2,480	-	4,960	-	4,960
	Little Fire Creek	882	-	-	882	882	-	-	882	-	882
	Little Fire Creek (middle split)	1,395	1,395	-	2,790	1,395	1,395	-	2,790	-	2,790
	Little Fire Creek (lower split)	2,395	320	-	2,715	2,395	320	-	2,715	-	2,715
	Lower Horsepen	-	-	-	-	-	-	-	-	-	-
Pocahontas	Pocahontas No. 7	1,788	22	-	1,810	1,788	22	-	1,810	-	1,810
	Pocahontas No. 4 Rider	2,787	1,878	885	5,550	2,787	1,878	885	5,550	-	5,550
	Pocahontas No. 4	6,685	6,685	6,685	20,055	6,685	6,685	6,685	20,055	-	20,055
	Pocahontas No. 3	8,648	8,743	885	18,276	8,648	8,743	885	18,276	-	18,276
	Pocahontas No. 2	1,788	15,788	10,536	28,080	1,788	15,788	10,536	28,080	-	28,080
	TOTALS	72,459	91,222	58,199	221,880	72,459	91,222	58,199	221,880	28,343	250,223
	TOTALS, COUNTY TOTALS	123,246	125,034	106,516	354,796	123,246	125,034	106,516	354,796	74,496	429,292
WISE COUNTY, VA. (crossed by more than 1,000 feet of overburden)											
Kanawha	Kelly Mark	39	-	-	39	39	-	-	39	-	39
New River	Jewell	153	953	225	1,331	153	-	-	153	1,435	1,588
	Upper Seaboard	1,435	-	-	1,435	1,435	-	-	1,435	2,870	4,305
	Upper Seaboard Rider	22	-	-	22	22	-	-	22	1,500	1,522
	Dirty Six	1,153	-	-	1,153	1,153	-	-	1,153	1,500	2,653
	Middle Seaboard	1,153	-	805	1,958	1,153	-	805	1,958	1,500	3,458
	Lower Seaboard	1,500	-	-	1,500	1,500	-	-	1,500	1,500	3,000
	Sewell B(?)	1,500	115	-	1,615	1,500	115	-	1,615	1,387	3,002
	Sewell A(?)	1,387	-	-	1,387	1,387	-	-	1,387	1,775	3,162
	Sewell(?)	1,453	722	-	2,175	1,453	722	-	2,175	-	2,175
	Upper Seaboard	1,387	-	-	1,387	-	-	-	-	827	827
	Middle Horsepen Rider	1,500	227	-	1,727	1,500	227	-	1,727	-	1,727
	Sewell B(?)	1,500	-	-	1,500	1,500	-	-	1,500	1,500	3,000
	Sewell A(?)	1,500	665	-	2,165	1,500	636	-	2,136	-	2,136
	Sewell(?)	1,387	16	-	1,403	1,387	16	-	1,403	16	1,419
	Upper Horsepen	1	-	-	1	1	-	-	1	-	1
	Lower Horsepen	-	-	-	-	-	-	-	-	-	-
	Middle Horsepen Rider	785	836	-	1,621	621	117	-	737	1,923	2,660
	War Creek	1,387	778	-	2,165	995	-	-	995	1,775	2,770
	War Creek Rider	407	-	98	505	-	-	-	-	385	385
Pocahontas	Pocahontas No. 7	835	835	835	2,505	-	-	-	-	1,535	1,535
	Pocahontas No. 4 Rider	1,387	2,471	4,166	10,024	890	35	-	925	2,471	3,396
	Pocahontas No. 4	1,500	6,500	1,500	9,500	1,500	61	132	1,693	6,500	8,193
	Pocahontas No. 3	1,500	8,500	5,000	15,000	1,500	61	132	1,693	6,500	8,193
	Pocahontas No. 2	1,500	1,500	1,500	4,500	1,500	61	132	1,693	6,500	8,193
	TOTALS	29,911	24,120	14,129	68,160	23,974	1,970	1,069	27,013	41,164	68,177
	WISE COUNTY, VA. TOTALS	29,911	24,120	14,129	68,160	23,974	1,970	1,069	27,013	41,164	68,177
WYOMING COUNTY, W.VA. (crossed by more than 1,000 feet of overburden)											
New River	Middle Seaboard	-	-	-	-	165	-	-	165	-	165
	Dirty Six	-	-	-	-	174	-	-	174	-	174
	Sewell B(?)	-	-	-	-	661	161	-	822	165	987
	Sewell(?)	-	-	-	-	661	161	-	822	165	987
	War Creek	-	-	-	-	-	168	-	168	165	333
	Fire Creek Rider	77	-	-	77	-	-	-	-	-	-
Pocahontas	Pocahontas No. 4 Rider	78	8	-	86	167	39	-	206	330	536
	Pocahontas No. 4	876	872	540	2,288	1,000	-	-	1,000	1,000	2,000
	Pocahontas No. 3	780	230	-	1,010	1,463	2,140	86	3,689	2,500	6,189
	Pocahontas No. 2	2,257	2,257	276	4,790	-	1,500	1,781	3,281	1,407	4,688
	TOTALS	3,991	3,367	816	8,174	3,470	3,848	1,867	9,185	5,732	14,917
	WYOMING COUNTY TOTALS	3,991	3,367	816	8,174	3,470	3,848	1,867	9,185	5,732	14,917
		17,852	19,277	10,177	47,306	15,508	12,621	6,939	37,068	14,197	51,265
	(Totals covered by less than 1,000 feet of overburden)										
		121,460	111,473	136,653	369,586	150,758	113,790	68,363	344,911	13,537	8,417	5,170	26,924	201,475	237,442	225,884	736,845	98,687	834,532
		14,316	11,786	20,429	47,031	40,891	52,976	47,581	141,448	17,511	6,661	7,618	31,790	72,458	69,581	75,580	238,383	755	237,628
	Grand totals	137,776	123,259	157,082	416,617	191,649	166,766	115,944	474,359	31,048	15,078	12,788	58,714	273,933	307,023	301,464	975,228	99,442	1,072,160

Table 2.—*Trace element composition of samples from the Amonate, Va.-W.Va. quadrangle*
[Values in parts per million. L after a value means less than value shown. N, means not detected. Analyses by U.S. Geological Survey.]

Trace element	Lower Seaboard coal bed, sample no. 1-DH-81	Upper Seaboard coal bed, sample no. 2-DH-81	Middle Seaboard coal bed, sample no. 3-DH-81	Middle Seaboard coal bed, sample no. 4-DH-81	Middle Seaboard coal bed, sample no. 5-DH-81	Pocahontas No. 4 coal bed, sample no. 6-DH-81	Pocahontas No. 4 coal bed, sample no. 7-DH-81	Pocahontas No. 4 coal bed, sample no. 8-DH-81	Pocahontas No. 4 coal bed, sample no. 9-DH-81	Lower Seaboard coal bed, sample no. 10-DH-81	Lower Seaboard coal bed, sample no. 11-DH-81	Upper Seaboard coal bed, sample no. 12-DH-81	Lower Seaboard coal bed, sample no. 13-DH-81	Lower Seaboard coal bed, sample no. 14-DH-81	Lower Seaboard coal bed, sample no. 15-DH-81	Jewell coal bed, sample no. 16-DH-81	Jewell coal bed, sample no. 17-DH-81	Jewell coal bed, sample no. 18-DH-81	Jewell coal bed, sample no. 19-DH-81	Middle Seaboard coal bed, sample no. 20-DH-81	Upper Horsepen Rider coal bed, sample no. 21-DH-81	War Creek coal bed, sample no. 22-DH-81	War Creek Rider coal bed, sample no. 23-DH-81	Fire Creek coal bed, sample no. 24-DH-81	Fire Creek coal bed, sample no. 25-DH-81	Little Fire Creek coal bed, sample no. 26-DH-81	Upper Horsepen Rider coal bed, sample no. 27-DH-81	Upper Horsepen Rider coal bed, sample no. 28-DH-81	Upper Horsepen Rider coal bed, sample no. 29-DH-81	Upper Horsepen Rider coal bed, sample no. 30-DH-81
Ag	0.64	0.82	0.64	0.47	0.64	0.58	0.64	0.82	0.64	0.82	0.64	0.64	0.58	0.58	0.64	0.82	0.64	0.58	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64
As	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Au	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
B	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
Ba	150	200	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Be	1.5	2.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Bi	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Cd	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Ce	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Co	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Cr	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Cu	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Eu	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ga	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Hf	1.47	1.49	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47
La	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Mo	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Nb	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Nd	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Ni	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Pb	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Sb	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Sc	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Sn	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Sr	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
Th	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
U	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
V	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
W	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Y	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Yb	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Zn	15	15	15	15	15	15	15	15	15	15	15	15	15

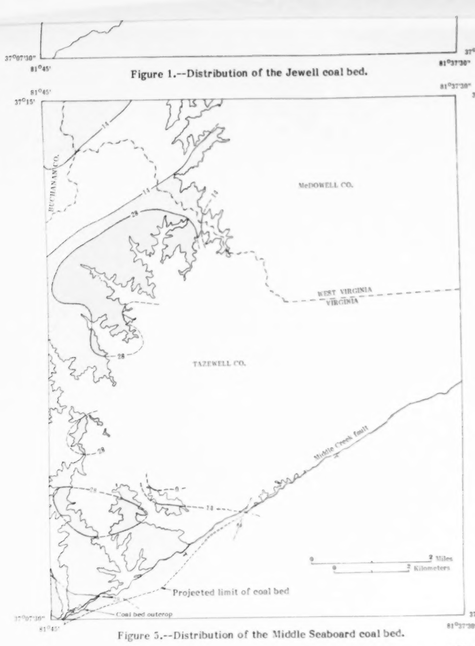


Figure 1.--Distribution of the Jewell coal bed.

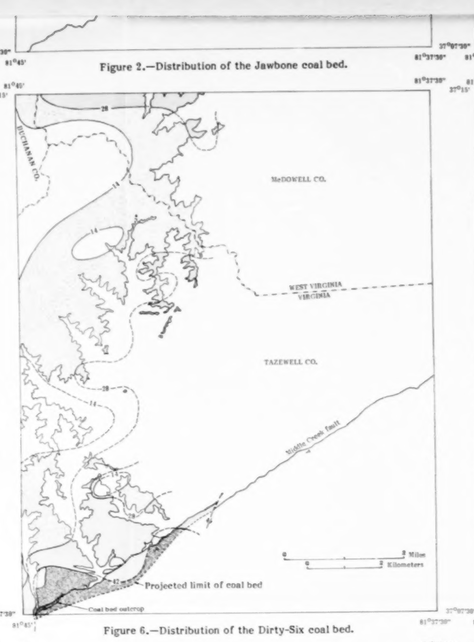


Figure 2.--Distribution of the Jawbone coal bed.

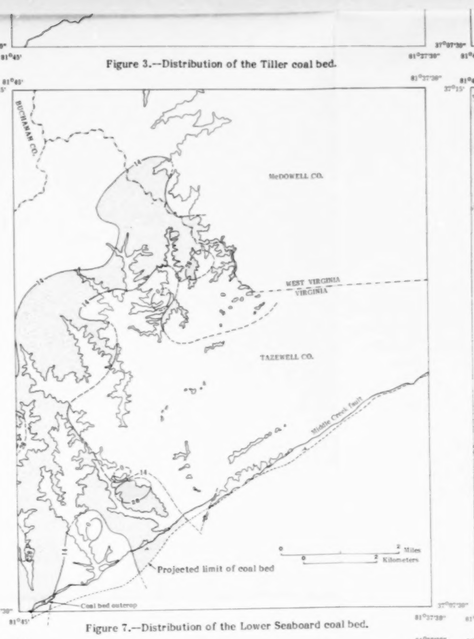


Figure 3.--Distribution of the Tiller coal bed.

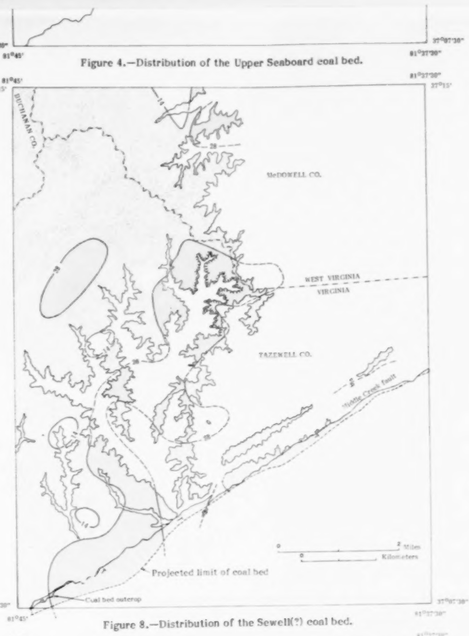


Figure 4.--Distribution of the Upper Seaboard coal bed.

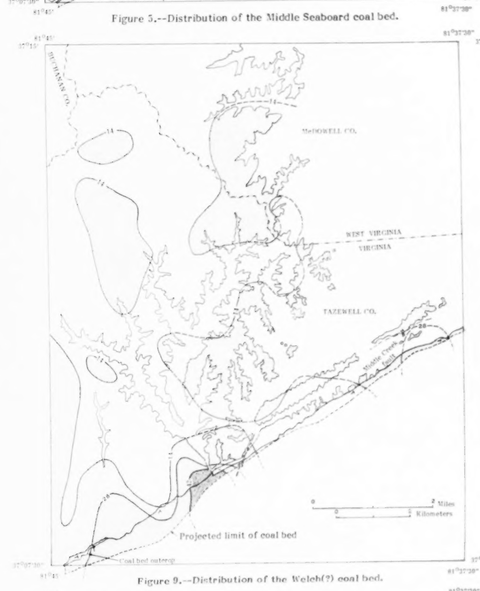


Figure 5.--Distribution of the Middle Seaboard coal bed.

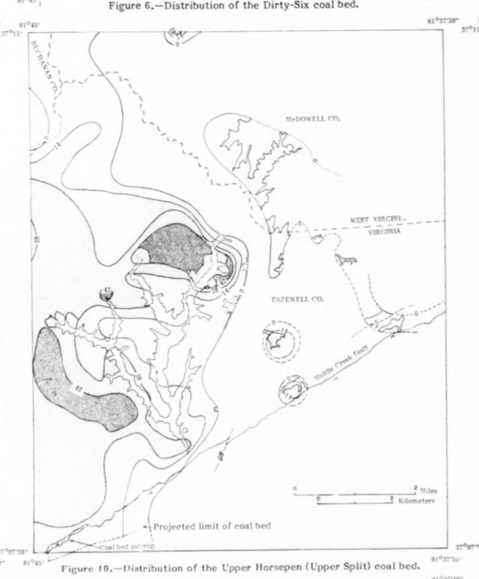


Figure 6.--Distribution of the Dirty-Six coal bed.

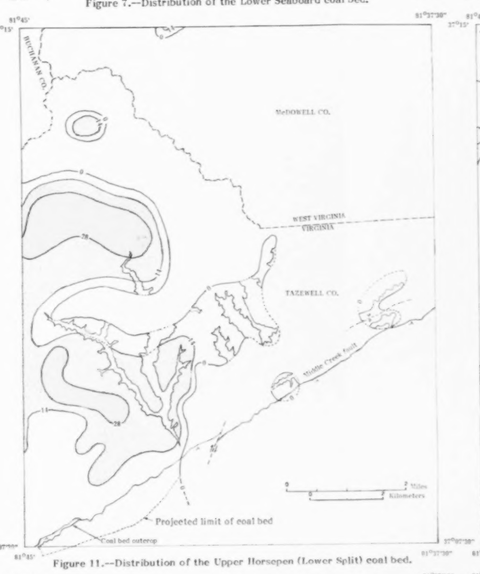


Figure 7.--Distribution of the Lower Seaboard coal bed.

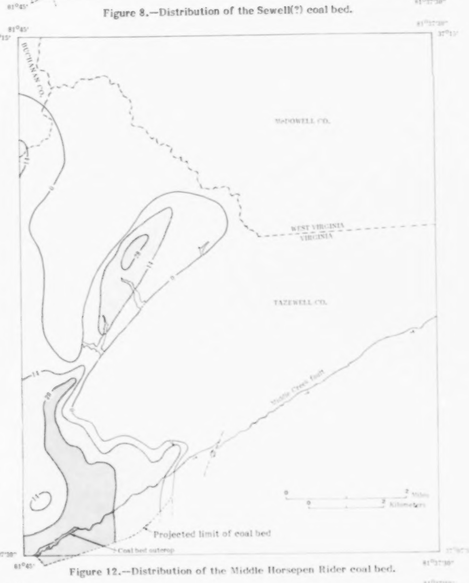


Figure 8.--Distribution of the Sewell(?) coal bed.

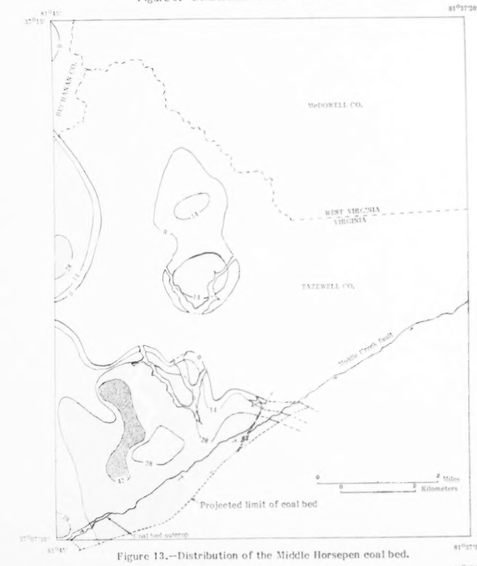


Figure 9.--Distribution of the Welch(?) coal bed.

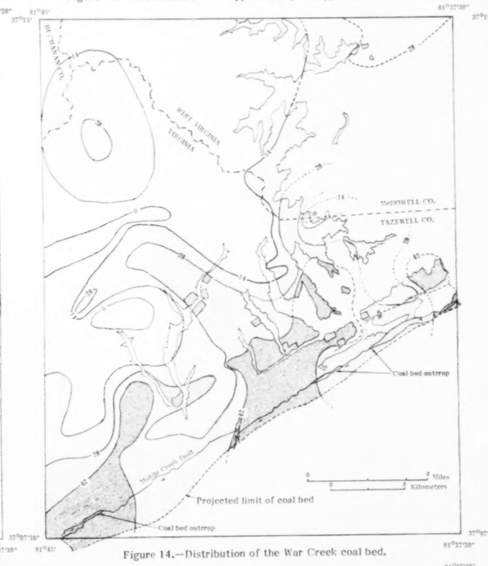


Figure 10.--Distribution of the Upper Horsepen (Upper Split) coal bed.

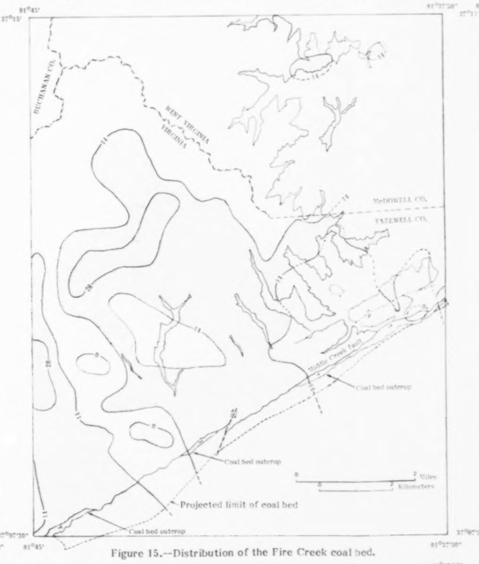


Figure 11.--Distribution of the Upper Horsepen (Lower Split) coal bed.

Figure 12.--Distribution of the Middle Horsepen Rider coal bed.

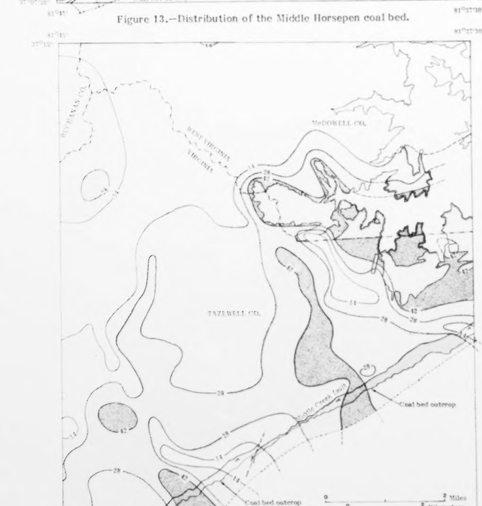


Figure 13.--Distribution of the Middle Horsepen coal bed.

Figure 14.--Distribution of the War Creek coal bed.

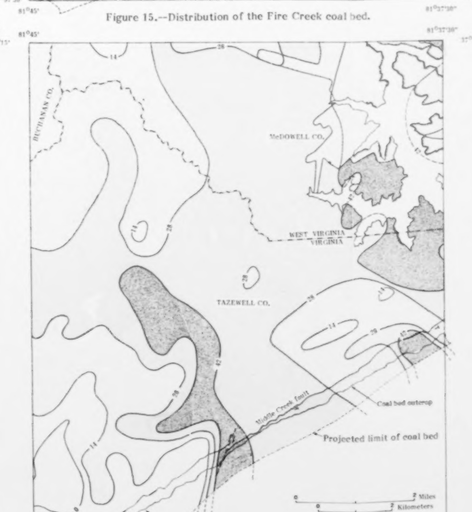


Figure 15.--Distribution of the Fire Creek coal bed.

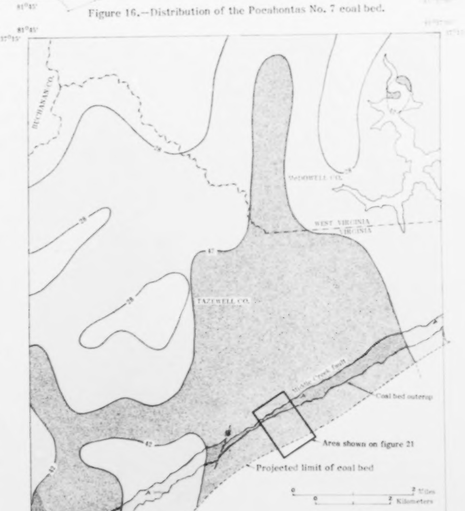


Figure 16.--Distribution of the Pocahontas No. 7 coal bed.

Figure 17.--Distribution of the Pocahontas No. 4 Rider coal bed.

Figure 18.--Distribution of the Pocahontas No. 4 coal bed.

Figure 19.--Distribution of the Pocahontas No. 3 coal bed.

Figure 20.--Distribution of the Squire Jim coal bed.

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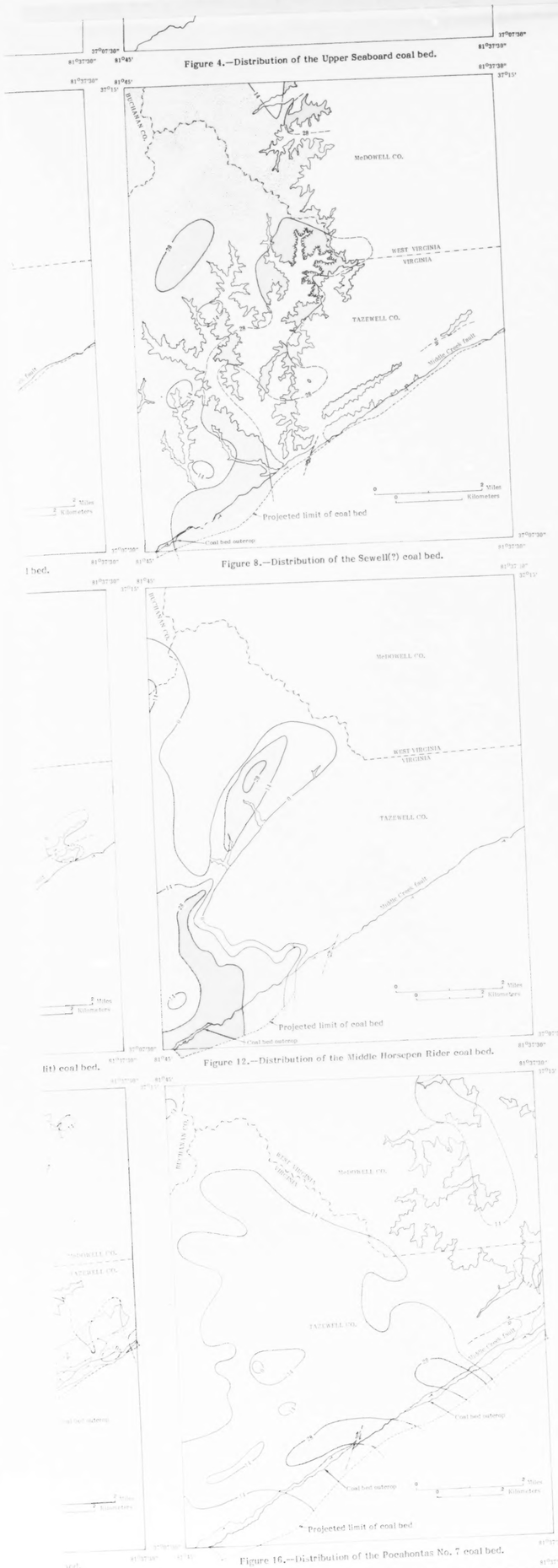


Figure 4.—Distribution of the Upper Seaboard coal bed.

lbed.

Figure 8.—Distribution of the Sewell(?) coal bed.

lit) coal bed.

Figure 12.—Distribution of the Middle Horsepen Rider coal bed.

Figure 16.—Distribution of the Pocahontas No. 7 coal bed.

al bed.

Figure 20.—Distribution of the Squire Jim coal bed.

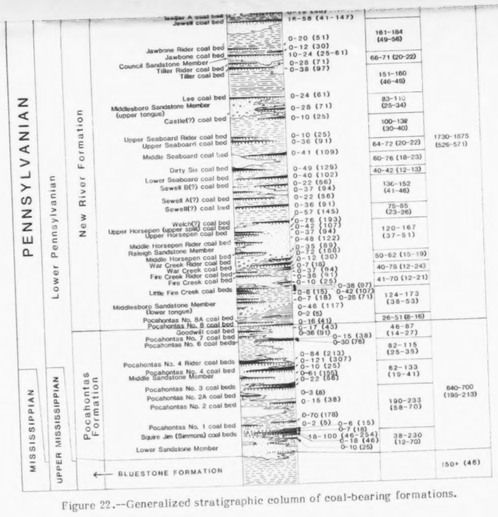
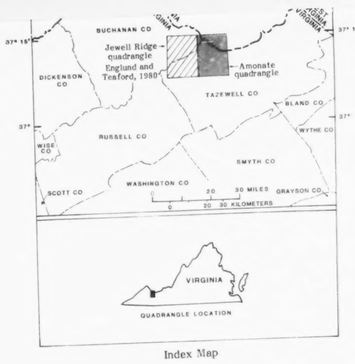


Figure 22.—Generalized stratigraphic column of coal-bearing formations.

The thickest coal overlies lobate sandstone beds of distributary delta systems (Englund, 1974, p. 43) Several coal beds have been extensively developed by underground, surface, and auger methods. Most of the production has been from the Pocahontas No. 3, No. 4, No. 4 Rider, Upper Horsepen, Sewell, and Jewell coal beds. Figures 1-20 show the distribution of coal resources of the major beds in the quadrangle. These should not be interpreted as geologic maps because folded and faulted portions of the coal beds south of the Middle Creek fault on figures 5-20 are depicted as if they were flat lying for purposes of resource calculations (fig. 21).

Approximately 3,150 feet (960 m) of coal-bearing rocks crop out in the quadrangle. These include the entire Pocahontas and New River Formations of Early Pennsylvanian age and the lower portion of the Kanawha Formation of Middle Pennsylvanian age. Figure 22 shows stratigraphic relations and thicknesses of the formations, coal beds, and intervening lithologies. Coal lithotypes are predominately thin- to thick-banded vitrinite, bright to dull attritus (mixed lithologies) containing minor fusinite bands, and sparsely disseminated pyrite and calcite. The Squire Jim and Dirty-Six coal beds contain numerous shale and underclay partings. Pocahontas coal is mostly fine cleated, whereas New River and Kanawha coals are medium to coarsely cleated. The coal field south of the Middle Creek fault has been deformed tectonically and a narrow belt of coal-bearing rocks is overturned, faulted, or asymmetrically folded. Coal beds in this belt have been sheared and crushed.

Thirty coal samples from 15 different beds were analyzed for trace elements (table 2) and major and minor oxide composition (table 3). Proximate and ultimate analyses for eight coal samples from five different beds are listed in table 4. The Middle Seaboard, War Creek Rider, and Squire Jim coal samples are high in trace element concentration and ash composition due to the inclusion of partings. The heating value for the Squire Jim coal, in parenthesis, was calculated as moisture and ash free. Most of the coal in the quadrangle is of high quality and is suitable for coke manufacture. Analyses of the samples, on an as-received basis, show that most of the coal is low to moderately high in ash (less than 9 percent), low to moderate in sulfur (less than 1 percent), and high in heating value (greater than 14,000 Btu/pound). No significant amounts of potentially toxic or economically valuable trace elements were found in the samples. Coal resources were calculated according to U.S. Geological Survey Bulletin 1450-B (1976). Analytical data are available from the National Coal Resource Data System (NCRDS).



Index Map

Table 1.—*Estimated original and remaining coal resources in the Amonate, Va.-W.Va. quadrangle*
[In thousands of short tons, as of January 1981]

Table 3.—*Major and minor oxide composition of the laboratory ash of coal samples from the Amonate, Va.-W.Va. quadrangle*
[Values in percent. L after a value means less than value shown. Analyses by U.S. Geological Survey.]

Table 4.—*Proximate and ultimate analyses of samples from the Amonate, Va.-W.Va. quadrangle*
[Analyses are as-determined basis. Channel samples by U.S. Geological Survey. Analyses by U.S. Bureau of Mines.]

Table 2.—*Trace element composition of samples from the Amonate, Va.-W.Va. quadrangle*
[Values in parts per million. L after a value means less than value shown. N, means not detected. Analyses by U.S. Geological Survey.]

MAPS SHOWING COAL RESOURCES OF THE AMONATE QUADRANGLE, BUCHANAN AND TAZEWELL COUNTIES, VIRGINIA AND McDOWELL COUNTY, WEST VIRGINIA

By
John F. Windolph, Jr.

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